



## INSTRUCTOR'S COURSE REQUIREMENTS

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**COURSE:**      **ELC 213**              **INSTRUMENTATION**

**SEMESTER & YEAR:**              **Spring 2017**

| INSTRUCTOR'S NAME | SECTION # | CLASS MEETING TIME | OFFICE HOURS AND OTHER CONTACT INFORMATION                                                                                                                      |
|-------------------|-----------|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Amir Niczad       | H1        | MW 01:45-03:00PM   | Office: Forte 315<br>Office hours: T TH 9:00A-12:00P<br>E-mail: <a href="mailto:asniczad@richmondcc.edu">asniczad@richmondcc.edu</a><br>Telephone: 910-410-1872 |

**METHODS OF INSTRUCTION AND EVALUATION:**

| STUDENT LEARNING OUTCOMES                                                                                                                 | METHODS OF INSTRUCTION                                                                                                      | SUCCESSFUL PERFORMANCE/BEHAVIORAL INDICATORS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | METHODS OF EVALUATION                                                                                                |
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| 1. Understand the basics of I&C including the different control functions, the types of control loop and continuous vs. discrete controls | <ul style="list-style-type: none"> <li>▪ On-line instructions and activities</li> <li>▪ Hands-on lab experiments</li> </ul> | Describe Five Common Process Variables and Give an Application of Each.<br>Define Two Types of Process Variables: Controlled and Manipulated.<br>Define a Process Instrument and Give an Example.<br>Define an Open Loop Process Control System and Give an Advantage.<br>Define a Closed-Loop Process Control System and Give an Advantage.<br>Describe the Function of Manual Control and Give an Application.<br>Describe the Operation of Open Loop Manual Control and Give an Application.<br>Describe the Operation of Closed-Loop Manual Control. | <ul style="list-style-type: none"> <li>▪ Quizzes</li> <li>▪ Exams</li> <li>▪ Lab performances and reports</li> </ul> |

| STUDENT LEARNING OUTCOMES                                                          | METHODS OF INSTRUCTION                                                                                                      | SUCCESSFUL PERFORMANCE/BEHAVIORAL INDICATORS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | METHODS OF EVALUATION                                                                                                |
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| <p>2. Know and understand how to interpret instrument &amp; control documents.</p> | <ul style="list-style-type: none"> <li>▪ On-line instructions and activities</li> <li>▪ Hands-on lab experiments</li> </ul> | <p>Describe the Function of a Block Diagram<br/> Describe the Function of the Three Basic Symbols of a Block Diagram.<br/> Describe the Function of an Instrument Tag<br/> Define the Six Types of Information described by an Instrument Tag<br/> Describe Five Types of Instrument Tags<br/> Describe How an Instrument Tag Identifies the Location of a Device<br/> Describe How to Use an Instrument Tag to Identify a Measured or Initiated Variable<br/> Describe How an Instrument Tag Identifies the Function of a Device<br/> Describe How to Identify the Area Where a device Is Located Given Its Instrument Tag.<br/> Describe How to Identify the Loop in Which a Device Is Connected Given Its Instrument Tag<br/> Describe How to Draw an Instrument Tag Given Device Information.<br/> Describe the Function of a P&amp;ID<br/> Describe the Function of a Loop Diagram<br/> Describe Ten Line Symbols Used in P&amp;IDs<br/> Describe How to Represent Binary Signals in a P&amp;ID<br/> Define Eleven P&amp;ID Valve Symbols<br/> Define Four P&amp;ID Valve Actuator Symbols<br/> Describe Three P&amp;ID Pump Symbols<br/> Describe Ten P&amp;ID Liquid Level Sensing Element Symbols<br/> Describe Eleven P&amp;ID Flow Sensing Element Symbols<br/> Describe Two P&amp;ID Pressure Sensing Element Symbols</p> | <ul style="list-style-type: none"> <li>▪ Quizzes</li> <li>▪ Exams</li> <li>▪ Lab performances and reports</li> </ul> |

| STUDENT LEARNING OUTCOMES                                                                                                                                                                                                                                             | METHODS OF INSTRUCTION                                                                                                      | SUCCESSFUL PERFORMANCE/BEHAVIORAL INDICATORS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | METHODS OF EVALUATION                                                                                                |
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|                                                                                                                                                                                                                                                                       |                                                                                                                             | Describe Two P&ID Temperature Sensing Element Symbols<br>Describe the Function of an Instrument Index<br>Describe How to Interpret Information Contained in an Instrument Index                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                      |
| 3. Familiar with different types of field instrumentation, their principle of operation, the advantages and disadvantages and the application of the different types of sensors for flow, level, pressure and temperature measurements as well as for control valves. | <ul style="list-style-type: none"> <li>▪ On-line instructions and activities</li> <li>▪ Hands-on lab experiments</li> </ul> | Describe the Functions of the Two Parts of a Sensor: The Transducer and the Transmitter<br>Describe Two Types of Analog Transmitter Signal Outputs<br>Describe Four Methods of Sensing Level and Give an Example of Each<br>Describe How to Measure Liquid Level Using a Pressure Sensor and Give an Application<br>Describe How to Measure Liquid Level Using a Bubbler and Give an Application<br>Describe the Operation of a Variable Capacitance Pressure Sensor<br>Describe How to Use a Multimeter to Measure a Pressure Sensor Output Signal<br>Define Specific Gravity and Describe Its Effect on Level Measurement<br>Describe How to Convert Liquid Level Units to Fluid Pressure Units<br>Define Sensitivity and Explain Its Importance<br>Describe How to Convert Pressure Sensor Output Signals to Pressure Units<br>Describe How to Convert Liquid Level Units to Sensor Output Signal Units<br>Define Display Scaling<br>Describe the Function of a Process Meter and Give an Application | <ul style="list-style-type: none"> <li>▪ Quizzes</li> <li>▪ Exams</li> <li>▪ Lab performances and reports</li> </ul> |

| STUDENT LEARNING OUTCOMES | METHODS OF INSTRUCTION | SUCCESSFUL PERFORMANCE/BEHAVIORAL INDICATORS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | METHODS OF EVALUATION |
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|                           |                        | <p>Describe the Operation of a Process Meter</p> <p>Describe How to Configure a Honeywell UDI 1700 Process Meter to Display a Process Variable</p> <p>Describe the Basic Function of Flow Measurement and Give an Application</p> <p>Define Three Flow Measurement Units</p> <p>Describe How to Convert between Velocity and Volumetric Flow Rate Units</p> <p>Convert between Velocity and Volumetric Flow Rates</p> <p>Describe How to Convert between Volumetric and Mass Flow Rate Units</p> <p>Convert between Volumetric and Mass Flow Rates</p> <p>Describe Four Categories of Flow Sensors and Give an Application of Each</p> <p>Describe the Operation of a Turbine Flow Sensor</p> <p>Describe the Operation of a Paddlewheel Flow Sensor</p> <p>Describe the Operation of the GF Signet 9900 Digital Transmitter</p> <p>Describe the Calibration Parameters of the GF Signet 9900 Digital Transmitter</p> <p>Describe How to Configure a GF Signet 9900 Digital Transmitter for Flow</p> <p>Configure a GF Signet 9900 Digital Transmitter for Flow</p> <p>Measure Flow Using a Paddlewheel Flow Sensor</p> <p>Describe the Operation of a Closed Loop Flow Control System</p> <p>Operate a Flow Control Loop Using a</p> |                       |

| STUDENT LEARNING OUTCOMES                                                                          | METHODS OF INSTRUCTION                                                                                                      | SUCCESSFUL PERFORMANCE/BEHAVIORAL INDICATORS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | METHODS OF EVALUATION                                                                                                |
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|                                                                                                    |                                                                                                                             | Paddlewheel Sensor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                      |
| <p>4. Understand the different types of computer-based control systems including PLCs and DCSs</p> | <ul style="list-style-type: none"> <li>▪ On-line instructions and activities</li> <li>▪ Hands-on lab experiments</li> </ul> | <p>Describe Two Categories of Loop Controllers and Give an Application of Each</p> <p>Describe Four Basic Functions of an Electronic Loop Controller</p> <p>Describe the Construction of an Electronic Loop Controller</p> <p>Describe How to Power Up a Honeywell UDC 3500 Controller and Determine Operating Status</p> <p>Describe How to Perform a Display and Key Test on the Honeywell UDC 3500 Controller</p> <p>Describe the Two Display Modes of the Honeywell UDC 3500 Controller</p> <p>Describe How to Navigate a Honeywell Loop Controller Menu System</p> <p>Describe Five Common Types of Loop Controller Parameter Groups</p> <p>Describe How to View and Interpret Controller Process Variables</p> <p>Describe How to Enter a Loop Controller Parameter Using the Control Panel Keys</p> <p>Describe How to Restore Factory Settings for the Honeywell UDC 3500 Controller</p> <p>Describe the Operation of an Electronic Loop Controller in Manual Mode</p> <p>Describe How to Connect a Loop Controller to a Final Control Element</p> <p>Describe How to Operate a Loop Controller in Manual Open Loop Mode</p> <p>Describe the Operation of an On/Off</p> | <ul style="list-style-type: none"> <li>▪ Quizzes</li> <li>▪ Exams</li> <li>▪ Lab performances and reports</li> </ul> |

| STUDENT LEARNING OUTCOMES | METHODS OF INSTRUCTION | SUCCESSFUL PERFORMANCE/BEHAVIORAL INDICATORS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | METHODS OF EVALUATION |
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|                           |                        | <p>Process Control System and Give an Application</p> <p>Describe the Operation of Relay-Based On/Off Process Control Systems</p> <p>Describe How to Program a Honeywell UDI 1700 Process Meter's Discrete Outputs to Control Alarms</p> <p>Describe How to Program a Honeywell UDI 1700 Process Meter to Perform On/Off Control</p> <p>Describe the Operation of a Closed-Loop Liquid Level Control System</p> <p>Describe the Effect of Two Types of Disturbances on a Closed Loop System</p> <p>Describe How to Configure and Operate a Honeywell UDC 3500 Controller-Based Closed-Loop System</p> <p>Configure and Operate a Honeywell UDC 3500 Controller-Based Closed-Loop Liquid Level System</p> <p>Describe the Function of Loop Controller Alarm Outputs and Give an Application</p> <p>Describe How to Connect and Operate the Alarm Relays on a Honeywell UDC 3500 Controller</p> <p>Connect and Operate Alarms on a Honeywell UDC 3500 Controller</p> <p>Describe the Function of Loop Controller Discrete Inputs and Give an Application</p> <p>Describe How to Configure and Operate the Discrete Inputs on a Honeywell UDC 3500</p> <p>Connect and Operate Discrete Inputs on a Honeywell UDC 3500 Controller</p> |                       |

| STUDENT LEARNING OUTCOMES                                   | METHODS OF INSTRUCTION                                                                                                      | SUCCESSFUL PERFORMANCE/BEHAVIORAL INDICATORS              | METHODS OF EVALUATION                                                                                                |
|-------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
|                                                             |                                                                                                                             |                                                           |                                                                                                                      |
| 5. Perform basic troubleshooting, diagnosis and elimination | <ul style="list-style-type: none"> <li>▪ On-line instructions and activities</li> <li>▪ Hands-on lab experiments</li> </ul> | Maintain, troubleshoot basic process control application. | <ul style="list-style-type: none"> <li>▪ Quizzes</li> <li>▪ Exams</li> <li>▪ Lab performances and reports</li> </ul> |

**TENTATIVE CLASS SCHEDULE AND ASSIGNMENTS:**

- A. Introduction to Process Control
- B. Instrumentation Tags
- C. Piping and Instrumentation Diagrams
- \* **First test**
- D. Loop Controllers
- E. Final Control Elements
- F. Level measurement
- G. Liquid Level Control
- \* **Second test**
- H. Method of Automatic Control
- I. Basic Flow Measurement and Control
- J. Control Loop Performance
- K. Ultrasonic Level Measurement and Control
- \* **Third test**
- \*\* **Final test**

[Academic Calendar](#)

[Policies and Important Information](#)

1. **Instructor:** Amir Niczad
2. **Email:** [asniczad@richmondcc.edu](mailto:asniczad@richmondcc.edu)

**3. Attendance:**

Promptness and regular class attendance are expected of all students. An absence, excused or unexcused, does not relieve the student of any course requirement. Attendance is required and punctuality is expected! A student is responsible for all the work, including tests, quizzes, lab work and any other assignments, of all class meetings. Following are the guidelines used by RCC Engineering department regarding students' attendance.

|   |                                                          |                                                      |
|---|----------------------------------------------------------|------------------------------------------------------|
| 1 | Missing more than 10% of classes.<br>(Unexcused absence) | Student's average grade will be dropped by 5 points. |
| 2 | Tardy                                                    | Miss more than 10 minutes of class or lab time       |
| 3 | Three tardy accounts                                     | Equals one absence                                   |

**4. Grading Scale:** The final grade will be based on the following criteria:

|                   |              |                     |
|-------------------|--------------|---------------------|
| Three exams ..... | 43%          | (300 Points)        |
| Labs.....         | 28.5%        | (200 Points)        |
| Quiz .....        | <u>28.5%</u> | <u>(200 Points)</u> |
|                   | <b>100%</b>  | <b>900 Points</b>   |

**A (90-100), B (80-89), C (70-79), D (60-69), and F (59 and below).**

**Quizzes are taken at the end of each Elearning module. To view a quiz for each module, first you have to complete the module.**

**Use MS word to complete the labs.**



5. **Withdrawal:** If you are going to drop one or more classes, you should follow the school's procedure. See a counselor or your instructor and obtain a drop form. This form should be signed by your instructor and returned to Student Development. You may also withdraw over the telephone by calling Student Development.

6. **Responsibility for Work:** The student is responsible for all material, assignments, and announcements in class. If you miss class, you should get class notes and assignments from another student or contact the instructor.

7. **Discipline Policy:** The school has a discipline policy which will be enforced. Under it, the college has the right to decline admission, to reprimand, to place on probation, to suspend, to expel, or to require the withdrawal of a student for just cause when it is deemed in the best interest of the college. A list of offenses is found in the College Catalog.

8. **Grievance Procedure:** If you have a complaint, try to work it out with the instructor. If this is not possible, talk to the department chair. If you can't work out the problem with the department chair, talk to the division chair for the department. If the issue still cannot be resolved, then talk to the Vice-President for Instruction.

9. **Other Notes:** It is against school policy for children to accompany adults to class. It is against school policy to have food or drinks in classrooms.

10. **Final Exam:** The final exam for this course is scheduled for **Last Day of Class.**

Note: If the college is closed during any of the exam days, the exam schedule will resume on the next day the college is open, completing the remaining exams.

11. **Academic Freedom:** Students' rights to express dissenting opinions from that held by the instructor are upheld. No student will be penalized for disagreeing with the instructor's opinion. However, students should know the difference between opinion and fact, as factual information is not subject to debate.

**12. Internet Use in the Classroom:** Connecting classrooms to the Internet and college computing resources opens immense possibilities for learning—but it also opens the risk of losing student attention to e-mail, instant messaging, web surfing, MP3 downloads, and even network hacking. Due to the increasing demands in technology and education, the internet is deemed necessary but should not be abused or accessed while in the classroom for these purposes. While in the classroom, Internet access is prohibited while the instructor is lecturing or when the class is involved in classroom exercises that do not include the internet. Internet activity will only be permitted when authorized by the instructor. There are NO exceptions to this classroom Policy.

**13. Late Work:** Assignments submitted late will be assessed a penalty of **-5 points** per school day late. Monday-Friday is counted 1 day each (weekends are counted as one day). The late penalty policy does **NOT** apply to the final term project, simply because late final projects will **NOT** be accepted due to end-of-the-semester grading constraints.

**14. Makeup Tests:**

When students have missed a test, the student may be allowed to make up the test **ONLY** if the instructor permits. Otherwise **ALL** test should be taken at the appropriated times.

**15. Cell Phones and Electronic Devices:** Classroom disruption by cell phones or other electronic devices is prohibited. All cell phones and similar electronic devices must remain turned off and out of sight for the duration of class. This includes headphones and Bluetooth devices. Personal Laptops, Net-books, I-pads, etc. are also prohibited without prior permission from your instructor. **If a student violates this policy, they will be asked to leave the classroom and be counted absent for the remainder of the class period or surrender their cell phone to the instructor for the remainder of the class. If a cell phone or an electronic device is used for cheating during a test, a student will be given a zero and given a failing grade for the class.** Cheating at RCC is not tolerated and may result in further disciplinary action. Exceptions to this policy, needs prior approval from the instructor before the class starts.

**16. Classroom and Campus Security requirements: Student IDs:** It is required that Student IDs be worn at **ALL** times while on Campus. All IDs must be clearly displayed on the front of an individual. Failure to display your Student ID on an ongoing basis will be Reported to the VP of Student Development and may result in disciplinary action.

**Classroom Doors:** The door will remain locked at all times while class is in session. (This is according to college policy.)

**17. RCC's Dress Code**

Appearance: You are expected to dress appropriately for the classroom environment. Sagging pants, clothing/jewelry with drug related signs, low cut tops, see through garments, too-short shorts, short skirts, leggings worn alone, halter tops, short midriff tops are not acceptable. No hats or head gear are allowed in the classroom. No gang affiliation is to be displayed. The instructor will notify any student if he/she is inappropriately dressed. If a student is found in violation of the above dress code, the garment error will be immediately corrected and the student can remain in class; or the student will be sent home to correct the garment error; or failure to comply with garment error will result in the student being referred to the Discipline Committee.

### **18. Contacting Instructor**

I am normally available during my posted office hours. I am available at other times if needed. The best way to contact me, by far, is e-mail or phone. Regardless of contact method, I return messages no later than 1 business day except under extenuating circumstances. If you are having a problem with your instructor you may discuss the issue with my immediate supervisor Dr. Devon Hall, Dean of Applied Sciences & Engineering. Dr. Hall's office is located in the Lee building room 059. Dr. Hall can also be reached by telephone at (910) 410-1912 or by email at [dghall@richmondcc.edu](mailto:dghall@richmondcc.edu)